

# PATENT ABSTRACTS OF JAPAN

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(54) PLURAL TRANSPONDER IDENTIFYING DEVICE AND METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To accurately detect a number of transponders located apart.

SOLUTION: A device and a method are to identify a number of transponders 10-16

entering into a collation area 18 for a calling device 20. For the transponders 10-16,

respectively independent identifying codes are assigned. When receiving calling pulses from

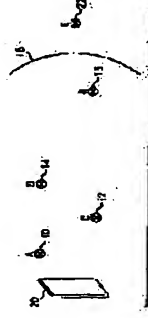
the calling device 20, the transponders 10-16 response thereto with the identifying codes. In

accordance with spatial distances from the transponders 10-16 to the calling device 20,

the calling device 20 detects and receives the strongest response. The received identifying

codes are memorized. The calling device 20 repeatedly transmits the calling pulses including the memorized identifying codes until all transponders 10-16 are identified

and read out.



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which has said resonance circuit which transmits the response which answers said authentication code which is not equal and has said memorized authentication code.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] About the field of a transponder, further, this invention is mutually left in a detail and relates to the equipment which checks two or more transponders located (far proximity), and its approach.

[0002]

[Description of the Prior Art] The transponder array is used in order to detect the body, the animal, and those who exist in the selected location, without contacting and to check them uniquely. Transponder equipment has typically the appeal equipment which transmits a frequency pulse, and two or more transponders which answer with the stored data of the format of the frequency carrier which received the pulse and was modulated. Since size of a transponder is small, it can be used for the application which it cannot finish counting to transponder equipment. For example, the load carried on the band conveyor can be delivered according to the destination currently checked and coded at the delivery point. The components of a machine can be checked and it can carry to the specific point in assembly Rhine. The pattern of a motion of livestock or action with which transponder equipment was embedded can be supervised and recorded, without being conspicuous. When people have the identification batch which transponder equipment attached, receipts and payments of a secure area can be performed without using a card reading machine.

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**CLAIMS**

[Claim(s)]

[Claim 1] It is the approach of checking two or more transponders included in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and an appeal pulse is generated and transmitted. It has any authentication codes which said appeal pulse calls out and are memorized by equipment memory. Said authentication code which receives said appeal pulse and is there is compared with said original authentication code. It is the approach of transmitting the response to said appeal pulse, if said authentication code is not equal, and including the process which memorizes said authentication code which said response has said original authentication code, receives the response which can be checked from said two or more transponders, and is contained there.

[Claim 2] The transmitter which is transponder equipment, is appeal equipment and transmits an appeal pulse receivable in memory and the place of collating. Said memory which it is the receiver which receives the highest transponder response of field strength, and said transponder response has an authentication code, and memorizes said received authentication code. The appeal equipment which has said transmitter which transmits said appeal pulse which also has whether it memorizes in said memory, and the becoming authentication code. They are two or more transponders which separate mutually and are located in the place of said collating. Each transponder The resonance circuit where it is the resonance circuit which receives said appeal pulse, and said appeal pulse has said authentication code. The memory which memorizes the authentication code of each transponder, respectively, and a control unit [ said authentication code memorized / receive said authentication code of said appeal pulse, and ], Transponder equipment which has the transponder

[0003] However, when two or more transponder equipments exist in the place (inquiry field) of collating of appeal equipment (interrogation unit), a problem arises. Two or more transponder equipments are in the place of collating, and when answering the appeal pulse of the appeal equipment at coincidence, only transponder equipment with the strongest field strength and the strongest property is detected and checked. As a result, the transponder equipment nearest to appeal equipment is usually checked. Other transponders far from appeal equipment are not checked, but an error produces them. Therefore, it is necessary to solve the problem at the time of detecting two or more transponder equipments which separate mutually and are located at the place of collating of appeal equipment.

[0004]

[Means for Solving the Problem and its Function] According to this invention, or it abolishes the fault accompanying conventional equipment, the equipment and the approach of reducing substantially of checking two or more transponders are offered. [0005] In the whole surface of this invention, the equipment and the approach of checking two or more transponders included in the place of collating of appeal equipment are offered. A respectively original authentication code is assigned to each transponder. If it calls out from appeal equipment and a pulse is received, each transponder will answer by each authentication code. Appeal equipment detects the strongest response and the spatial distance of each transponder to appeal equipment receives it. The received authentication code is memorized. Appeal equipment repeats the appeal pulse which has the memorized authentication code, and is transmitted until all transponders are checked and read.

[0006] other fields of this invention — setting — appeal equipment — an authentication code — memorizing — predetermined time — it is held in memory. An authentication code is deleted after confirming that the reinput to the place of collating with this predetermined time is detected.

[0007]

[Example] This invention and the example with the desirable advantage are best understood by referring to the drawing of drawing 5 from drawing 1. In these drawings, the same reference number shows an equivalent part or a corresponding part.

[0008] Drawing 1 shows the typical example with authentication code A to D at the place 18 of collating of appeal equipment 20 of two or more transponders 10-16. As shown here, equally [ the spatial distance from appeal equipment 20 to each transponder ], the transponder 10 is most close and its transponder 16 is the furthest in the place 18 of collating. The place 18 of collating expresses the area which can

receive easily the appeal pulse or power pulse which calls out and is generated by equipment 20. The place 18 of collating may include the continuous radio frequency signal which is not modulated or modulated. It can appeal for transponders 10-16, can appeal for them from equipment 20, they can receive a pulse, and can answer by the memorized data and each authentication code to it. The transponder 22 located in the outside of the place 18 of collating does not receive an appeal pulse, therefore does not join transmission of stored data so that it may illustrate.

[0009] In a typical transponder array, appeal equipment 20 transmits RF appeal pulse.

An appeal pulse can energize the transponder located in the place of collating (energize), and can answer by the data memorized. However, in the example shown in drawing 1, transponders 10-16 receive an appeal pulse, and answer coincidence substantially at it. Although it appeals for a transponder 10 spatially, and it is checked by equipment 20 with appeal equipment 20 since most near and its response have the highest field strength, the response of transponders 12-16 is disregarded. Therefore, existence of transponders 12-16 is not detected correctly.

[0010] Furthermore, reference of drawing 2 and drawing 3 shows the process at which two or more transponders located in the place 18 of collating of appeal equipment 20 are checked to the flow chart and the time sequence chart. As shown in blocks 30 and 32, it begins from appeal equipment 20 calling out and transmitting a pulse. As shown in block 34, in response to this, each transponders 10-16 located in the place 18 of collating transmit the response containing authentication code A to some data memorized there and original D. In one example of this invention, an authentication code may be a 64-bit bit string. However, in order to check all transponders uniquely, only transmission with as little number of bits as [ the min of an authentication code ] is required in many applications.

[0011] In the typical example shown in drawing 1, it is most close, and since the property (field characteristic) of a place is probably the strongest, a transponder 10 detects a transponder 10 and its response of authentication code A, and receives appeal equipment 20. In blocks 38 and 40, appeal equipment 20 memorizes authentication code A of a transponder 10, and transmits an appeal pulse further. At this time, an appeal pulse contains the authentication code the transponder 10 was remembered to be. By including an authentication code, a response and its reception of a transponder 10 can be checked as a matter of fact.

[0012] If an appeal pulse is received as shown in block 42, since transponders 12-16 differ from the code which each authentication code calls out and is contained in a pulse, they will answer. A transponder 12 calls out at this time, and since it is the

closest to equipment 20, the response of that authentication code calls out and it is checked by equipment 20. Therefore, collating of the block 44 which determines whether a transponder is in the place 18 of collating answers by affirmation. As shown in blocks 36 and 38, a transponder 12 is checked and the authentication code C is memorized. As shown in blocks 40-44 and drawing 3, it appeals for appeal equipment 20 with the memorized authentication code, and it continues transmitting a pulse until it checks transponders 14 and 16 and stops receiving no responses after that. In order that a transponder 22 may remain out of the range of the place 18 of collating, it does not receive an appeal pulse and does not carry out a response, either.

[0013] As shown in drawing 3, appeal equipment 20 deletes the memorized authentication code from memory at the time of the predetermined time termination after transponders 10-16 detect. Preferably, an authentication code is memorized by time order (chronological), and each code will be deleted if fixed time amount passes. For example, it may be used, in order that [ which is the predetermined capacity c ] it may put in the point and a point broth train may memorize an authentication code. A check of the transponder of 1st c plus deletes the first checked transponder from a train.

[0014] The die length and/or train capacity of predetermined time have the large place depended on the application of transponder equipment. For example, when a transponder is considered to move to the outside into the place of collating for a short time, and when it is desirable to be checked whenever it goes into the place of these transponder collatings, predetermined time and train capacity are set more as accuracy according to the reaction to the pattern of this actuation. Conversely, a transponder applies longer time, and when carrying out actuation in which it enters or remains in the place of collating, predetermined time and train capacity are set up so that it may have a longer grace period (linger time). In order to detect the postponement time amount of each transponder as an alternative example in the same example, storage time and standard die length can be shortened, and a timer can be used in order to measure postponement time amount.

[0015] The simplified block diagram of one example of appeal equipment 50 is shown about drawing 4. Appeal equipment 50 has the microprocessor 52 which takes charge of control of the sequence of a function. A microprocessor 52 is combined with the memory 54 including the above-mentioned train used for memorizing the authentication code of the checked transponder. Furthermore, a transmitter 56 and a receiver 58 are contained. The transmitter 56 and the receiver 58 may include the radio frequency (RF) oscillator (not shown) and the resonance circuit (not shown), and

the configuration and operation are indicated by the name "a transponder array" of invention for which it applied on October 1 [ / the United States patent number 5,053,774th and else / surrealism man ], 1991.

[0016] Drawing 5 shows the simplified block diagram of one example of a transponder 70. A transponder 70 has the resonance circuit 72 combined with the energy storage device 74. A resonance circuit 72 may have the receiver coil (not shown) combined in parallel with the 1st capacitor (not shown). The energy storage device 74 may contain the 2nd capacitor (not shown) combined with the resonance circuit 72 by the serial. The control unit 76 with memory 78 is offered further. A control unit 76 is

memorizable in memory, in order to appeal for a receipt and it and to transmit the input signal from the sensor (not shown) in which a certain environmental physical parameter, for example, ambient temperature, and an environmental pressure are shown to equipment. The original authentication code of a transponder is also memorized by memory 78. Furthermore, response formulation equipment (formulator) 80 reads memory 78, and formulates the code pattern response to an appeal pulse. the reception of an appeal pulse which the deexcitation-sized circuit 82 controlled by the control unit 76 is offered further, and has the authentication code — responding — a energy storage device 74 — a short circuit (shorting) and deexcitation-izing — or a by-pass (bypass) is carried out. Furthermore, it is provided. The deexcitation-sized circuit 82 acts so that an appeal pulse cannot be answered and the response of a transponder may be oppressed. The detail of a transponder circuit is indicated by the name "a transponder array" of the 5,053,774th above-mentioned invention of an United States patent number.

[0017] Although this invention was explained with reference to the example for explanation, it does not have the intention of this explanation being interpreted by restrictive semantics. Various deformation of the example for these explanation, and not only combination but other examples of this invention are also clear to the mastery person of the field of this technique, if this explanation is referred to. Therefore, it means that an attached claim includes all these deformation and combination.

[0018] The above explanation is related and the following term is indicated further.

[0019] (1) It is the approach of checking two or more transponders included in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and an appeal pulse is generated and transmitted. It has any authentication codes which said appeal pulse calls out and are memorized by equipment memory. Said authentication code which receives said

appeal pulse and is there is compared with said original authentication code. It is the approach of transmitting the response to said appeal pulse, if said authentication code is not equal, and including the process which memorizes said authentication code which said response has said original authentication code, receives the response which can be checked from said two or more transponders, and is contained there.

[0020] (2) An approach including the process which deletes each authentication code further memorized after predetermined time in an approach given in said 1st term.

[0021] (3) The process which memorizes said authentication code further in an approach given in said 1st term is an approach including the process which memorizes said authentication code by memory one by one.

[0022] (4) An approach including the process which continues generating and transmitting said appeal pulse which contains said memorized authentication code in said 1st term further in the approach of a publication.

[0023] (5) It is the approach of checking two or more transponders located in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and generate an appeal pulse and it transmits. The response in which the check to said appeal pulse from the checked transponder is possible is received. Said response has an authentication code, memorizes said received authentication code, generates other appeal pulses containing said memorized authentication code, and transmits it. An approach including the process which deactivates said checked transponder, repeats reception of an authentication code and a storage process, calls out until said two or more transponders of all at the place of said collating are checked, and generates and transmits a pulse.

[0024] (6) How to include the process which deletes said memorized authentication code after further predetermined storage time in said 5th term in the approach of a publication.

[0025] (7) The process which memorizes said authentication code in an approach given in said 5th term is an approach including the process which carries out the sequential storage of said authentication code according to detection of time order.

[0026] (8) The process which memorizes said authentication code in an approach given in said 5th term is an approach including the process which memorizes said authentication code of one train.

[0027] (9) It is the approach of being said transponder which calls out from said appeal equipment and receives a pulse in an approach given in said 5th term, and including further the process which answers said appeal pulse, only when, as for each

transponder, said received authentication code does not collate said received authentication code with said original authentication code as compared with an original authentication code including the authentication code said appeal pulse was remembered to be (match).

[0028] (10) It is the approach of checking two or more transponders included in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and generate an appeal pulse and it transmits. Generate the response to said appeal pulse by said two or more transponders, and it transmits. Said response detects the strongest response that has the authentication code of a transponder respectively and has an authentication code, and is received. Memorize said received authentication code, and generate the new (other) appeal pulse which has said authentication code, and it transmits. Until two or more transponders of all that deactivate a transponder with the authentication code checked by the appeal pulse (deactivate), and are in the place of said collating of said are checked An approach including the process which repeats reception of an authentication code and a storage process, generates an appeal pulse, and is transmitted.

[0029] (11) How to include further the process which deletes said memorized authentication code after predetermined storage time in said 10th term in the approach of a publication.

[0030] (12) The process which memorizes said authentication code in an approach given in said 10th term is an approach including the process which carries out the sequential storage of said authentication code according to detection of time order.

[0031] (13) The approach the process which memorizes said authentication code includes memorizing said authentication code of a single tier in said 10th term in the approach of a publication.

[0032] (14) It is the approach of including further the process which answers said appeal pulse, only when said received authentication code does not collate with an original authentication code the authentication code which each transponder received in the approach given in said 10th term as compared with an original authentication code.

[0033] It is transponder equipment and is appeal equipment. (15) Memory. They are the transmitter which transmits an appeal pulse receivable in the place of collating, and the receiver which receives the highest transponder response of field strength. Said memory which said transponder response has an authentication code and memorizes said received authentication code, The appeal equipment which has said

transmitter which transmits said appeal pulse which also has whether it memorizes in said memory, and the becoming authentication code. They are two or more transponders which separate mutually and are located in the place of said collating. Each transponder The resonance circuit where it is the resonance circuit which receives said appeal pulse, and said appeal pulse has said authentication code. The memory which memorizes the authentication code of each transponder, respectively, and a control unit [ said authentication code memorized / receive said authentication code of said appeal pulse, and ], Transponder equipment which has the transponder which has said resonance circuit which transmits the response which answers said authentication code which is not equal and has said memorized authentication code. [0034] (16) Transponder equipment with which it is transponder equipment given in the 15th term, and said authentication code memorized by said memory is deleted after predetermined time.

[0035] (17) Transponder equipment with which it is transponder equipment given in the 15th term, and said appeal equipment memory has memory one by one. [0036] (18) The equipment and the approach of checking appeal equipment (two or more transponder (10)-(16) included in the place (18) of collating of 20)) are offered. As for transponder (10)-(16), a respectively original authentication code is assigned. If it calls out from appeal equipment (20) and a pulse is received --- each transponder (10) - (16) answers by each authentication code. each transponder (10) - to appeal equipment (20) --- according to the spatial distance of (16), appeal equipment (20) detects the strongest response and is received. The received authentication code is memorized. Appeal equipment (20) repeats the appeal pulse containing the memorized authentication code, and is transmitted until all transponder (10)-(16) is checked and read.

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**TECHNICAL FIELD**

[Industrial Application] About the field of a transponder, further, this invention is mutually left in a detail and relates to the equipment which checks two or more transponders located (far proximity), and its approach.

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**TECHNICAL PROBLEM**

[Description of the Prior Art] The transponder array is used in order to detect the body, the animal, and those who exist in the selected location, without contacting and to check them uniquely. Transponder equipment has typically the appeal equipment which transmits a frequency pulse, and two or more transponders which answer with the stored data of the format of the frequency carrier which received the pulse and was modulated. Since size of a transponder is small, it can be used for the application which it cannot finish counting to transponder equipment. For example, the load carried on the band conveyor can be delivered according to the destination currently checked and coded at the delivery point. The components of a machine can be checked and it can carry to the specific point in assembly Rhine. The pattern of a motion of livestock or action with which transponder equipment was embedded can be supervised and recorded, without being conspicuous. When people have the

identification batch which transponder equipment attached, receipts and payments of a secure area can be performed without using a card reading machine.

[0003] However, when two or more transponder equipments exist in the place (inquiry field) of collating of appeal equipment (interrogation unit), a problem arises. Two or more transponder equipments are in the place of collating, and when answering the appeal pulse of the appeal equipment at coincidence, only transponder equipment with the strongest field strength and the strongest property is detected and checked. As a result, the transponder equipment nearest to appeal equipment is usually checked. Other transponders far from appeal equipment are not checked, but an error produces them. Therefore, it is necessary to solve the problem at the time of detecting two or more transponder equipments which separate mutually and are located at the place of collating of appeal equipment.

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**OPERATION**

[Means for Solving the Problem and its Function] According to this invention, or it abolishes the fault accompanying conventional equipment, the equipment and the approach of reducing substantially of checking two or more transponders are offered.

[0005] In the whole surface of this invention, the equipment and the approach of checking two or more transponders included in the place of collating of appeal equipment are offered. A respectively original authentication code is assigned to each transponder. If it calls out from appeal equipment and a pulse is received, each transponder will answer by each authentication code. Appeal equipment detects the

strongest response and the spatial distance of each transponder to appeal equipment receives it. The received authentication code is memorized. Appeal equipment repeats the appeal pulse which has the memorized authentication code, and is transmitted until all transponders are checked and read.

[0006] Other fields of this invention — setting — appeal equipment — an authentication code — memorizing — predetermined time — it is held in memory. An authentication code is deleted after confirming that the reinput to the place of collating with this predetermined time is detected.

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**EXAMPLE**

[Example] This invention and the example with the desirable advantage are best understood by referring to the drawing of drawing 5 from drawing 1. In these drawings, the same reference number shows an equivalent part or a corresponding part.

[0008] Drawing 1 shows the typical example with authentication code A to D at the place 18 of collating of appeal equipment 20 of two or more transponders 10-16. As shown here, equally [ the spatial distance from appeal equipment 20 to each transponder ], the transponder 10 is most close and its transponder 16 is the furthest in the place 18 of collating. The place 18 of collating expresses the area which can receive easily the appeal pulse or power pulse which calls out and is generated by equipment 20. The place 18 of collating may include the continuous radio frequency signal which is not modulated or modulated. It can appeal for transponders 10-16, can appeal for them from equipment 20, they can receive a pulse, and can answer by the

memorized data and each authentication code to it. The transponder 22 located in the outside of the place 18 of collating does not receive an appeal pulse, therefore does not join transmission of stored data so that it may illustrate.

[0009] In a typical transponder array, appeal equipment 20 transmits RF appeal pulse. An appeal pulse can energize the transponder located in the place of collating (energize), and can answer by the data memorized. However, in the example shown in drawing 1, transponders 10-16 receive an appeal pulse, and answer coincidence substantially at it. Although it appeals for a transponder 10 spatially, and it is checked by equipment 20 with appeal equipment 20 since most near and its response have the highest field strength, the response of transponders 12-16 is disregarded. Therefore, existence of transponders 12-16 is not detected correctly.

[0010] Furthermore, reference of drawing 2 and drawing 3 shows the process at which two or more transponders located in the place 18 of collating of appeal equipment 20 are checked to the flow chart and the time sequence chart. As shown in blocks 30 and 32, it begins from appeal equipment 20 calling out and transmitting a pulse. As shown in block 34, in response to this, each transponders 10-16 located in the place 18 of collating transmit the response containing authentication code A to some data memorized there and original D. In one example of this invention, an authentication code may be a 64-bit bit string. However, in order to check all transponders uniquely, only transmission with as little number of bits as [ the min of an authentication code ] is required in many applications.

[0011] In the typical example shown in drawing 1, it is most close, and since the property (field characteristic) of a place is probably the strongest, a transponder 10 detects a transponder 10 and its response of authentication code A, and receives appeal equipment 20. In blocks 38 and 40, appeal equipment 20 memorizes authentication code A of a transponder 10, and transmits an appeal pulse further. At this time, an appeal pulse contains the authentication code the transponder 10 was remembered to be. By including an authentication code, a response and its reception of a transponder 10 can be checked as a matter of fact.

[0012] If an appeal pulse is received as shown in block 42, since transponders 12-16 differ from the code which each authentication code calls out and is contained in a pulse, they will answer. A transponder 12 calls out at this time, and since it is the closest to equipment 20, the response of that authentication code calls out and it is checked by equipment 20. Therefore, collating of the block 44 which determines whether a transponder is in the place 18 of collating answers by affirmation. As shown in blocks 36 and 38, a transponder 12 is checked and the authentication code C is

memorized. As shown in blocks 40-44 and drawing 3, it appeals for appeal equipment 20 with the memorized authentication code, and it continues transmitting a pulse until it checks transponders 14 and 16 and stops receiving no responses after that. In order that a transponder 22 may remain out of the range of the place 18 of collating, it does not receive an appeal pulse and does not carry out a response, either.

[0013] As shown in drawing 3, appeal equipment 20 deletes the memorized authentication code from memory at the time of the predetermined time termination after transponders 10-16 detect. Preferably, an authentication code is memorized by time order (chronological), and each code will be deleted if fixed time amount passes. For example, it may be used, in order that [ which is the predetermined capacity c ] it may put in the point and a point broth train may memorize an authentication code. A check of the transponder of 1st c plus deletes the first checked transponder from a train.

[0014] The die length and/or train capacity of predetermined time have the large place depended on the application of transponder equipment. For example, when a transponder is considered to move to the outside into the place of collating for a short time, and when it is desirable to be checked whenever it goes into the place of these transponder collatings, predetermined time and train capacity are set more as accuracy according to the reaction to the pattern of this actuation. Conversely, a transponder applies longer time, and when carrying out actuation in which it enters or remains in the place of collating, predetermined time and train capacity are set up so that it may have a longer grace period (linger time). In order to detect the postponement time amount of each transponder as an alternative example in the same example, storage time and standard die length can be shortened, and a timer can be used in order to measure postponement time amount.

[0015] The simplified block diagram of one example of appeal equipment 50 is shown about drawing 4. Appeal equipment 50 has the microprocessor 52 which takes charge of control of the sequence of a function. A microprocessor 52 is combined with the memory 54 including the above-mentioned train used for memorizing the authentication code of the checked transponder. Furthermore, a transmitter 56 and a receiver 58 are contained. The transmitter 56 and the receiver 58 may include the radio frequency (RF) oscillator (not shown) and the resonance circuit (not shown), and the configuration and operation are indicated by the name "a transponder array" of invention for which it applied on October 1 [ / the United States patent number 5,053,774th and else / surrealism man ], 1991.

[0016] Drawing 5 shows the simplified block diagram of one example of a transponder



70. A transponder 70 has the resonance circuit 72 combined with the energy storage device 74. A resonance circuit 72 may have the receiver coil (not shown) combined in parallel with the 1st capacitor (not shown). The energy storage device 74 may contain the 2nd capacitor (not shown) combined with the resonance circuit 72 by the serial. The control unit 76 with memory 78 is offered further. A control unit 76 is memorizable in memory, in order to appeal for a receipt and it and to transmit the input signal from the sensor (not shown) in which a certain environmental physical parameter, for example, ambient temperature, and an environmental pressure are shown to equipment. The original authentication code of a transponder is also memorized by memory 78. Furthermore, response formulation equipment (formulator) 80 reads memory 78, and formulates the code pattern response to an appeal pulse. the reception of an appeal pulse which the deexcitation-ized circuit 82 controlled by the control unit 76 is offered further, and has the authentication code — responding — a energy storage device 74 — a short circuit (shorting) and deexcitation-izing — or a by-pass (bypass) is carried out. Furthermore, it is provided. The deexcitation-ized circuit 82 acts so that an appeal pulse cannot be answered and the response of a transponder may be oppressed. The detail of a transponder circuit is indicated by the name "a transponder array" of the 5.053.774th above-mentioned invention of an United States patent number.

[0017] Although this invention was explained with reference to the example for explanation, it does not have the intention of this explanation being interpreted by restrictive semantics. Various deformation of the example for these explanation, and not only combination but other examples of this invention are also clear to the mastery person of the field of this technique, if this explanation is referred to. Therefore, it means that an attached claim includes all these deformation and combination.

[0018] The above explanation is related and the following term is indicated further.  
 [0019] (1) It is the approach of checking two or more transponders included in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and an appeal pulse is generated and transmitted. It has any authentication codes which said appeal pulse calls out and are memorized by equipment memory. Said authentication code which receives said appeal pulse and is there is compared with said original authentication code. It is the approach of transmitting the response to said appeal pulse, if said authentication code is not equal, and including the process which memorizes said authentication code which said response has said original authentication code, receives the response

which can be checked from said two or more transponders, and is contained there.  
 [0020] (2) An approach including the process which deletes each authentication code further memorized after predetermined time in an approach given in said 1st term.  
 [0021] (3) The process which memorizes said authentication code further in an approach given in said 1st term is an approach including the process which memorizes said authentication code by memory one by one.  
 [0022] (4) An approach including the process which continues generating and transmitting said appeal pulse which contains said memorized authentication code in said 1st term further in the approach of a publication.  
 [0023] (5) It is the approach of checking two or more transponders located in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and generate an appeal pulse and it transmits. The response in which the check to said appeal pulse from the checked transponder is possible is received. Said response has an authentication code, memorizes said received authentication code, generates other appeal pulses containing said memorized authentication code, and transmits it. An approach including the process which deactivates said checked transponder, repeats reception of an authentication code and a storage process, calls out until said two or more transponders of all at the place of said collating are checked, and generates and transmits a pulse.  
 [0024] (6) How to include the process which deletes said memorized authentication code after further predetermined storage time in said 5th term in the approach of a publication.  
 [0025] (7) The process which memorizes said authentication code in an approach given in said 5th term is an approach including the process which carries out the sequential storage of said authentication code according to detection of time order.  
 [0026] (8) The process which memorizes said authentication code in an approach given in said 5th term is an approach including the process which memorizes said authentication code of one train.  
 [0027] (9) It is the approach of being said transponder which calls out from said appeal equipment and receives a pulse in an approach given in said 5th term, and including further the process which answers said appeal pulse, only when, as for each transponder, said received authentication code does not collate said received authentication code with said original authentication code as compared with an original authentication code including the authentication code said appeal pulse was remembered to be (match).

[0028] (10) It is the approach of checking two or more transponders included in the place of collating of appeal equipment. Assign an authentication code original with each of two or more of said transponders, and generate an appeal pulse and it transmits. Generate the response to said appeal pulse by said two or more transponders, and it transmits. Said response detects the strongest response that has the authentication code of a transponder respectively and has an authentication code, and is received. Memorize said received authentication code, and generate the new (other) appeal pulse which has said authentication code, and it transmits. Until two or more transponders of all that deactivate a transponder with the authentication code checked by the appeal pulse (deactivate), and are in the place of said collating of said are checked An approach including the process which repeats reception of an authentication code and a storage process, generates an appeal pulse, and is transmitted.

[0029] (11) How to include further the process which deletes said memorized authentication code after predetermined storage time in said 10th term in the approach of a publication.

[0030] (12) The process which memorizes said authentication code in an approach given in said 10th term is an approach including the process which carries out the sequential storage of said authentication code according to detection of time order.

[0031] (13) The approach the process which memorizes said authentication code includes memorizing said authentication code of a single tier in said 10th term in the approach of a publication.

[0032] (14) It is the approach of including further the process which answers said appeal pulse, only when said received authentication code does not collate with an original authentication code the authentication code which each transponder received in the approach given in said 10th term as compared with an original authentication code.

[0033] It is transponder equipment and is appeal equipment. (15) Memory. They are the transmitter which transmits an appeal pulse receivable in the place of collating, and the receiver which receives the highest transponder response of field strength. Said memory which said transponder response has an authentication code and memorizes said received authentication code. The appeal equipment which has said transmitter which transmits said appeal pulse which also has whether it memorizes in said memory, and the becoming authentication code. They are two or more transponders which separate mutually and are located in the place of said collating. Each transponder The resonance circuit where it is the resonance circuit which

receives said appeal pulse, and said appeal pulse has said authentication code. The memory which memorizes the authentication code of each transponder, respectively, and a control unit [ said authentication code memorized / receive said authentication code of said appeal pulse, and ]. Transponder equipment which has the transponder which has said resonance circuit which transmits the response which answers said authentication code which is not equal and has said memorized authentication code. [0034] (16) Transponder equipment with which it is transponder equipment given in the 15th term, and said authentication code memorized by said memory is deleted after predetermined time.

[0035] (17) Transponder equipment with which it is transponder equipment given in the 15th term, and said appeal equipment memory has memory one by one.

[0036] (18) The equipment and the approach of checking appeal equipment (two or more transponder (10)-(16) included in the place (18) of collating of 20)) are offered. As for transponder (10)-(16), a respectively original authentication code is assigned. if it calls out from appeal equipment (20) and a pulse is received — each transponder (10) - (16) answers by each authentication code. each transponder (10) - to appeal equipment (20) — according to the spatial distance of (16). appeal equipment (20) detects the strongest response and is received. The received authentication code is memorized. Appeal equipment (20) repeats the appeal pulse containing the memorized authentication code, and is transmitted until all transponder (10)-(16) is checked and read.

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[Translation done.]

**\* NOTICES \***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

3. In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The simple sectional view showing two or more transponders located in the place of collating of appeal equipment.

[Drawing 2] The simple flow chart of the process which reads two or more transponders alternatively.

[Drawing 3] Data flow and time constant Rhine (time line) of this process.

[Drawing 4] The simplified block diagram of one appeal equipment.

[Drawing 5] The simplified block diagram of a transponder.

[Description of Notations]

10-16 Transponder

18 Place of Enquiry

20 Appeal Equipment

[Translation done.]

\* NOTICES \*

JP0 and NCIP1 are not responsible for any damages caused by the use of this translation.

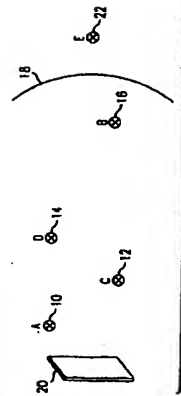
1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. \*\*\*\* shows the word which can not be translated.

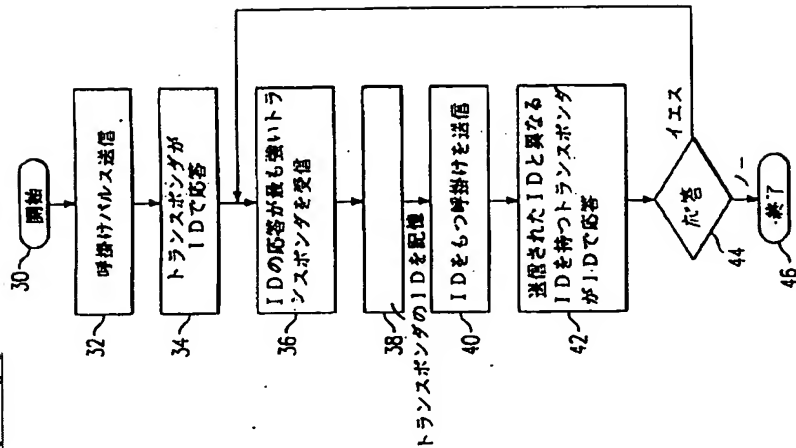
3. In the drawings, any words are not translated.

DRAWINGS

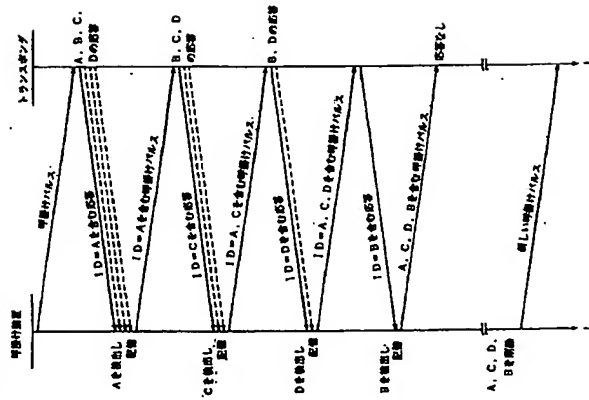
[Drawing 1]



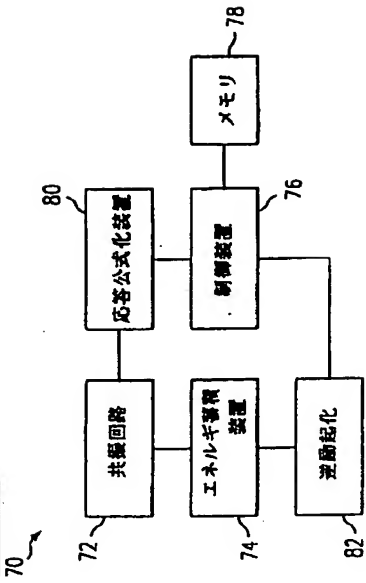
[Drawing 2]



[Drawing 3]

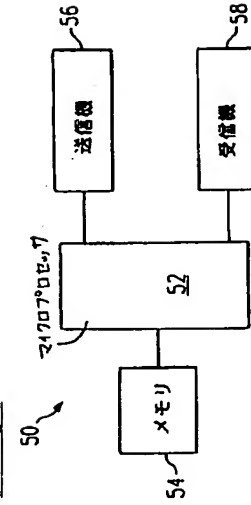


[Drawing 5]



[Translation done.]

[Drawing 4]





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ある確認コードAからDをもつ複数のトランスポンダ10から16の代表的な例を示す。ここに示すように、呼掛け装置20から各トランスポンダ10の空間的距離は等しくなく、トランスポンダ10は一般に接近しており、トランスポンダ16は照合の場18の中で最も近い。照合の場18は呼掛け装置20によって発生される呼掛けパルス又は電力パルスを容易に受信できる領域を表す。照合の場18は、連続的な変調された又は変調されていない無線周波数信号を含んでいてよい。トランスポンダ10から16は呼掛け装置20から呼掛けパルスを受信し、それに対し、記憶されたデータおよび特定の確認コードで応答することができる。図示するように、呼掛け装置18の外側に位置するトランスポンダ22は、呼掛けパルスを受信せず、そのため記憶データの送信には加わらない。

【0009】典型的なトランスポンダ配列において、呼掛け装置20はRF呼掛けパルスを送信する。呼掛けパルスは照合の場の中に位置するトランスポンダを付勢 (energize) して、記憶されているデータで応答することとができる。しかし図1に示した例においてトランスポンダ10から16は、呼掛けパルスを受信し、実質的に同時にそれに応答する。トランスポンダ10は空間的に呼掛け装置20に最も近く、その応答は場の強度が最も高いため、呼掛け装置20によって確認される。従って、トランスポンダ12から16の応答は無視される。従って、トランスポンダ12から16の存在は正しく検出されない。

【0010】更に図2及び図3を参照すると、呼掛け装置20の照合の場18の中に位置する複数のトランスポンダが確認される工程が、フローチャート及びタイムシークエンスチャートに示されている。ブロック30及び32に示すように、呼掛け装置20が呼掛けパルスを送信することから始まる。ブロック34に示すように、これに応じて、照合の場18の中に位置する各トランスポンダ10から16が、そこに記憶されている幾つかのデータと独自の確認コードAからDを含む応答を送信する。本発明の実施例において、確認コードは64ビットのビットストリングであってよい。しかし、全てのトランスポンダを独自に確認するために、確認コードの最小ビット数の少ない送信のみが、多くの用途において要求される。

【0011】図1に示した代表的な例において、トランスポンダ10が最も近接して、場の特性 (field characteristic) が最も強い。呼掛け装置20はトランスポンダ10とその確認コードAの応答を検出し受信する。ブロック38及び40において、呼掛け装置20はトランスポンダ10の確認コードAを記憶し、更に呼掛けパルスを送信する。このとき、呼掛けパルスはトランスポンダ10の記憶された確認コードを含む。確認コードを含むことにより、トランスポンダ10の応

答及びその受信を事実上確認できる。

【0012】ブロック42に示すように、呼掛けパルスを受信すると、トランスポンダ12から16はそれぞれ確認コードが呼掛けパルスに含まれるコードと異なるため応答する。このとき、トランスポンダ12が呼掛け装置20に最も近い。その確認コードの応答が呼掛け装置20によって確認される。そのため照合の場18の中にトランスポンダがあるかどうかを決定するブロック44の照合は、肯定で応答する。ブロック36及び38に示すように、トランスポンダ12は確認され、その確認コードCは記憶される。ブロック40から44及び図3に示すように、呼掛け装置20は、それがトランスポンダ14及び16を確認してその後何ら応答を受信しないまで、記憶された確認コードと共に呼掛けパルスを送信しつづける。トランスポンダ22は照合の場18の範囲の外に現れるため、呼掛けパルスを受取らず、応答もしない。

【0013】図3に示すように、トランスポンダ10から16の検出された後の所定時間終了時に、呼掛け装置20は記憶した確認コードをメモリから削除する。好ましくは、確認コードは時間順 (chronological) に記憶される。例えば、所定容量cの先入れ先出し列が確認コードを記憶するために用いられ得る。cプログラムのトランスポンダが確認されると、確認された最初のトランスポンダは列から削除される。

【0014】所定時間の長さ及び/又は列容量は、トランスポンダ装置の用途によるものが大きい。例えば、トランスポンダが照合の場の中及び外へ移動すると考えられる場合、及びこれらのトランスポンダ照合の場に入るたびに確認されることが望ましい場合、所定時間及び列容量はこの動作のパターンへの反応に依り、より正確に設定される。逆にトランスポンダが、より長い時間かけて照合の場に入る又は現る動作をするような場合、所定時間及び列容量はより長い待ち期間 (linger time) を有するように設定される。同様の例において代替例として、各トランスポンダの待ち時間を検出するために記憶時間及び標準的長さを知覚することができ、待ち時間を測定するためにタイマーを用いることができる。

【0015】図4に関して、呼掛け装置50の実施例の簡略ブロック図が示されている。呼掛け装置50は、機能の順序の制御を受け持つマイクロプロセッサ52を有する。マイクロプロセッサ52は、確認されたトランスポンダの確認コードを記憶するのに用いる前述の列を含むメモリ54に結合される。更に、送信機56と受信機58が含まれる。送信機56と受信機58は無線周波数 (RF) 発振器 (図示せず) と共振回路 (図示せず) とを含んでいてよく、その構成と作用は米国特許番号

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10月1日に出版された発明の名称「トランスポンダ配列」に記載されている。

【0016】図5はトランスポンダ700の実施例の簡略ブロック図を示す。トランスポンダ700は、エネルギー供給装置74に結合された共振回路72を有する。共振回路72は第1のコンデンサ (図示せず) と平行に結合された受信コイル (図示せず) を有し得る。エネルギー供給装置74は、共振回路72に直列に結合された第2のコンデンサ (図示せず) を含んでいてよい。メモリ78を持つ制御装置76が更に提供される。制御装置76は、環境の或る物理的パラメータ、例えば、周囲温度及び圧力を示すセンサ (図示せず) からの入力信号を受取り、それを呼掛け装置へ送信するためにメモリに記憶することができ得る。トランスポンダの独自の確認コードもメモリ78に記憶される。更に、応答公式化装置 (formula) 80がメモリ78を読み取り、呼掛けパルスに対するコードパターン応答を公式化する。制御装置76によって制御される逆起回路82がさらに提供され、その確認コードを有する呼掛けパルスの受信に応じ、エネルギー蓄積装置74を短絡 (shorting)、逆起化、又は逆起化 (bypass) する。更に提供される。逆起化回路82は、呼掛けパルスに反応することによって、トランスポンダの応答を抑圧するように作用するようにトランスポンダの制御は、前述の米国特許番号第5,053,774号、発明の名称「トランスポンダ配列」に記載されている。

【0017】本発明を説明用の実施例を参照して説明したが、本説明が限定的な意味に解釈されることを意図しているのではない。これら説明用の実施例の種々の変形及び組合せばかりでなく本発明の他の実施例も、本説明を参照すればこの技術の分野の熟練者にとって明白である。したがって、発明の特許請求の範囲はあらゆるこれらの変形及び組合せを包含することを意図する。

【0018】以上の説明の関して更に次の項を指示する。

【0019】(1) 呼掛け装置の照合の場に入る複数のトランスポンダを確認する方法であって、前記複数のトランスポンダの各々に独自の確認コードを割り当て、呼掛けパルスを発生及び送信し、前記呼掛けパルスが呼掛け装置メモリに記憶されているいかなる確認コードをも有し、前記呼掛けパルスを受信してそこにある前記確認コードを前記独自の確認コードと比較し、前記確認コードが等しくなければ前記呼掛けパルスへの応答を送信し、前記応答は前記独自の確認コードを有し、前記複数のトランスポンダから確認可能な応答を受信し、そこに含まれる前記確認コードで記憶する工程を含む方法。

【0020】(2) 前記第1項に記載の方法において、さらに所定時間後に記憶された各確認コードを削除する工程を含む方法。

【0021】(3) 前記第1項に記載の方法において

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て、さらに前記確認コードを記憶する工程は、順次メモリで前記確認コードを記憶する工程を含む方法。

【0022】(4) 前記第1項に記載の方法において、さらに前記記憶された確認コードを含む前記呼掛けパルスを発生及び送信しつづける工程を含む方法。

【0023】(5) 呼掛け装置の照合の場の中に位置する複数のトランスポンダを確認する方法であって、前記複数のトランスポンダの各々に独自の確認コードを割り当て、呼掛けパルスを発生して送信し、確認されたトランスポンダから前記呼掛けパルスへの確認可能な応答を受信し、前記応答は確認コードを有し、前記受信した確認コードを記憶し、前記記憶された確認コードを含む他の呼掛けパルスを発生して送信し、前記確認されたトランスポンダを非活性化し、確認コードの受信及び記憶工程を繰り返す、前記照合の場にある前記複数のトランスポンダの全てが確認されるまで呼掛けパルスを発生及び送信する工程を含む方法。

【0024】(6) 前記第5項に記載の方法において、さらに所定の記憶時間の後、前記記憶された確認コードを削除する工程を含む方法。

【0025】(7) 前記第5項に記載の方法において、前記確認コードを記憶する工程は、時間順の検出に応じて、前記確認コードを順次記憶する工程を含む方法。

【0026】(8) 前記第5項に記載の方法において、前記確認コードを記憶する工程は、1列の前記確認コードを記憶する工程を含む方法。

【0027】(9) 前記第5項に記載の方法において、前記呼掛け装置から呼掛けパルスを受信する前記トランスポンダであって、前記呼掛けパルスは記憶された確認コードを含み、各トランスポンダは前記受信した確認コードを独自の確認コードと比較し、前記受信した確認コードが前記独自の確認コードと照合 (match) しない場合のみ、前記呼掛けパルスに反応する工程を含む方法。

【0028】(10) 呼掛け装置の照合の場に入る複数のトランスポンダを確認する方法であって、前記複数のトランスポンダの各々に独自の確認コードを割り当て、呼掛けパルスを発生して送信し、前記複数のトランスポンダによる前記呼掛けパルスへの応答を発生して送信し、前記応答は各々トランスポンダの確認コードを有し、確認コードを有する最も強い応答を検出して受信し、前記受信した確認コードを記憶し、前記確認コードを有する新たな (other) 呼掛けパルスを発生して送信し、呼掛けパルスに記憶された確認コードを持つトランスポンダを非活性化 (deactivate) し、前記前記照合の場にある複数のトランスポンダのすべてが確認されるまで、確認コードの受信及び記憶工程を繰り返す、呼掛けパルスを発生して送信する工程を含む方法。

【0029】(11) 前記第10項に記載の方法にお

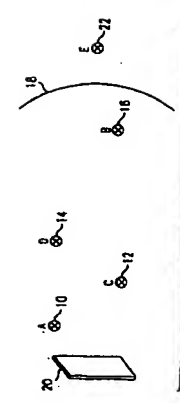
7  
いて、所定の記憶時間後に前記記憶された確認コードを削除する工程を含む方法。  
【0030】(12) 前記第10項に記載の方法において、前記確認コードを記憶する工程は、時間順の検出に従って前記確認コードを順次記憶する工程を含む方法。  
【0031】(13) 前記第10項に記載の方法において、前記確認コードを記憶する工程が、一列の前記確認コードを記憶することを含む方法。  
【0032】(14) 前記第10項に記載の方法において、各トランスポンダは受信した確認コードが独自の確認コードと比較し、前記受信した確認コードが独自の確認コードと照合しない場合のみ、前記呼掛けハルスに応答する工程を含む方法。  
【0033】(15) トランスポンダ装置であって、呼掛け装置であって、メモリと、照合の場の中で受信可能な呼掛けハルスを送信する送信器と、場の強度の最も高いトランスポンダに受信する受信機と、前記トランスポンダに受信した確認コードを有し、前記受信した確認コードを記憶する前記メモリと、前記メモリに記憶された確認コードも有する前記呼掛けハルスを送信する前記送信器とを有する呼掛け装置と、前記照合の場の中に互いに隣れて位置する複数のトランスポンダであって、各トランスポンダは、前記呼掛けハルスを受信する共振回路と、各トランスポンダの確認コードを夫々記憶するメモリと、前記呼掛けハルスの前記確認コードを受信し、前記記憶されている確認コードと比較する制御装置と、等しくない前記確認コードに応じて、前記記憶した確認コードを有する応答を送信する前記共振回路とを有するトランスポンダと、を有するトランスポンダ装置。

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\* 【0034】(16) 第15項に記載のトランスポンダ装置であって、前記メモリに記憶された前記確認コードが、所定時間後に削除されるトランスポンダ装置。  
【0035】(17) 第15項に記載のトランスポンダ装置であって、前記呼掛け装置メモリが順次メモリを有するトランスポンダ装置。  
【0036】(18) 呼掛け装置(20)の照合の場(18)に入る複数のトランスポンダ(10)-(16)を確認する装置および方法が提供される。トランスポンダ(10)-(16)はそれぞれ独自の確認コードが割り当てられる。呼掛け装置(20)から呼掛けハルスを受信すると、各トランスポンダ(10)-(16)はそれぞれの確認コードで応答する。呼掛け装置(20)に対する各トランスポンダ(10)-(16)の空問題の距離に従い、呼掛け装置(20)は最も強い応答を検出して受信する。受信した確認コードは記憶される。呼掛け装置(20)は全てのトランスポンダ(10)-(16)が確認され読み込まれるまで、記憶された確認コードを含む呼掛けハルスを繰り返し送信する。

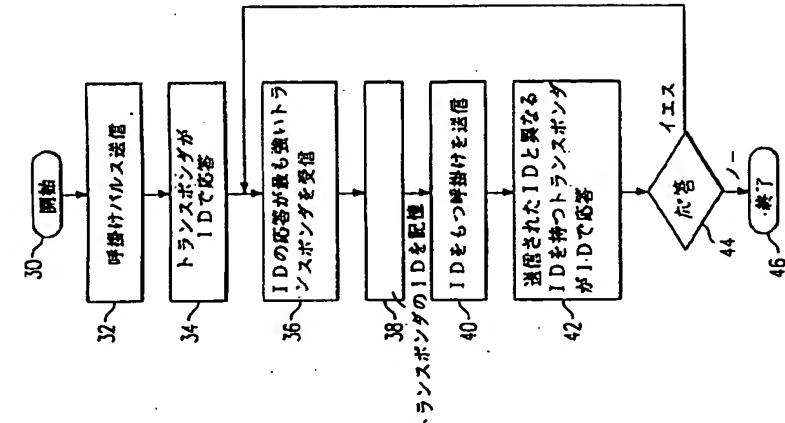
9  
【図面の簡単な説明】  
【図1】呼掛け装置の照合の場に位置する複数のトランスポンダを示す簡略断面図。  
【図2】複数のトランスポンダを選択的に読み出す工程の簡略フローチャート。  
【図3】同工程のデータ・フロー及び特定数ライン(line)。  
【図4】一つの呼掛け装置の簡略ブロック図。  
【図5】トランスポンダの簡略ブロック図。  
【符号の説明】  
10-16 トランスポンダ  
18 照合の場  
20 呼掛け装置

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【図1】呼掛け装置の照合の場に位置する複数のトランスポンダを示す簡略断面図。  
【図2】複数のトランスポンダを選択的に読み出す工程の簡略フローチャート。  
【図3】同工程のデータ・フロー及び特定数ライン(line)。  
【図4】一つの呼掛け装置の簡略ブロック図。  
【図5】トランスポンダの簡略ブロック図。  
【符号の説明】  
10-16 トランスポンダ  
18 照合の場  
20 呼掛け装置

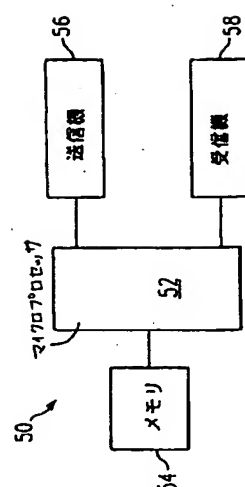
【図1】



【図2】



【図4】



【図5】

